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# Lessons from Washington

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*Results of a study trip to state services in Washington, USA for a comparison of incident clearance times*



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2009

## Abbreviations

Abbreviation	Meaning
<b>CAD</b>	Computer Aided Dispatch (Washington State Patrol system that tracks dispatches)
<b>COP</b>	Common Operational Picture (A state in which all participants of a given process continuously have a similar perception of that process)
<b>GMAP</b>	Government Management, Accountability & Performance. State program for which WSP and WSDOT report incident clearance performance together.
<b>IRP</b>	Incident Response Program (WSDOT program for incident management)
<b>IRT</b>	Incident Response Team(s) (WSDOT responders for incidents)
<b>JOPS</b>	Joint Operations Policy Statement (Agreement between WSP and WSDOT on collaboration)
<b>ODOT</b>	Oregon Department of Transportation (State government organization designated similar to WSDOT. However, ODOT is the road authority for state Oregon - giving them responsibilities to ensure incident clearance)
<b>TMC</b>	Traffic management centre
<b>WITS</b>	Washington Incident Tracking System (Washington Department Of Transportation system for incident reporting)
<b>WSDOT</b>	Washington State Department of Transportation (State government organization designated to ensure public safety, maintain roads, build roads, and build and maintain other transportation systems)
<b>WSP</b>	Washington State Patrol (Police organization designated to ensure public safety, enforce law and investigate crime scenes at the highways in Washington. Also holding road authority for the state)

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## Introduction

The SPINlab (VU University Amsterdam) is researching Rijkswaterstaats' (to-be-effectuated) management policies for highway incident clearance. In these studies, the SPINlab is mainly interested in:

- a) Whether information deficits in Incident Management lead to longer road clearance times
- b) How spatially enriched information and net centric workflows can decrease information deficit in Incident Management and reduce road clearance times

In January 2009, SPINlab researchers visited Washington State Department of Transportation (WSDOT) and Washington State Patrol (WSP) operatives to start a benchmark study on Incident Management performance. Their study trip concentrated on the western part of Washington, and was designated to answer the following questions:

- 1) What are the WSDOT & WSP policies on Incident Management?
- 2) In how far is a Common Operational Picture achieved in state Washington?
- 3) How can Washington incident clearance performance be compared with the RWS performance?
- 4) What are the success factors that contributed to current Washington state incident management policies?
- 5) What WSDOT/WSP measures can contribute to successful faster clearance times in the Netherlands?

## Reading

This report will try to answer these questions. It will start with a sketch of the context in which incidents in Washington are managed. After that, the process of clearing an incident in King County (WA) will be described to sketch Washington incident management policies. Lastly, answers to the questions stated before are given. The three-day program of the study trip is added as an appendix.

## Thanks

We have met many people on our trip, and we would like to express our thanks for their help to each and every one of them. We would especially like to thank Rick Phillips, who created a great schedule, and through his immense network made it possible for us to meet so many and learn so much.

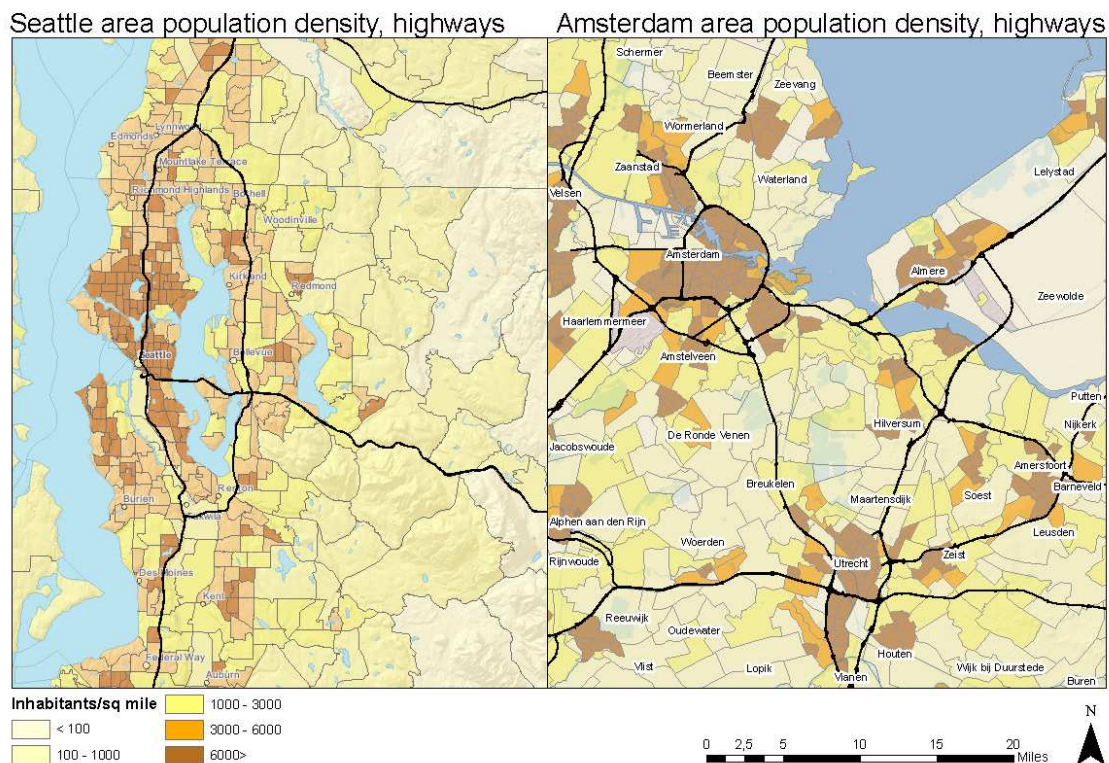
## Context

This chapter will deal with the context in which incident clearance is managed in Washington. First, an overview of the geographical and traffic-specifics of Washington are given. After that, an overview of the organizations involved in incident management in Washington is given, and the work of the Washington State Department of Transport and Washington State Police is elaborated upon. Finally, the JOPS agreement between Washington State Police and the Washington State Department of Transport is explained.

## Washington geography and traffic

Washington is a state of contrasts. On the one hand the state has vast unpopulated areas. On the other hand the state houses a number of large urban areas. In the northwestern part of Washington, Seattle and Tacoma form a large conurbation. Vancouver in the southwest of Washington is a part of the cross-state Portland conurbation.

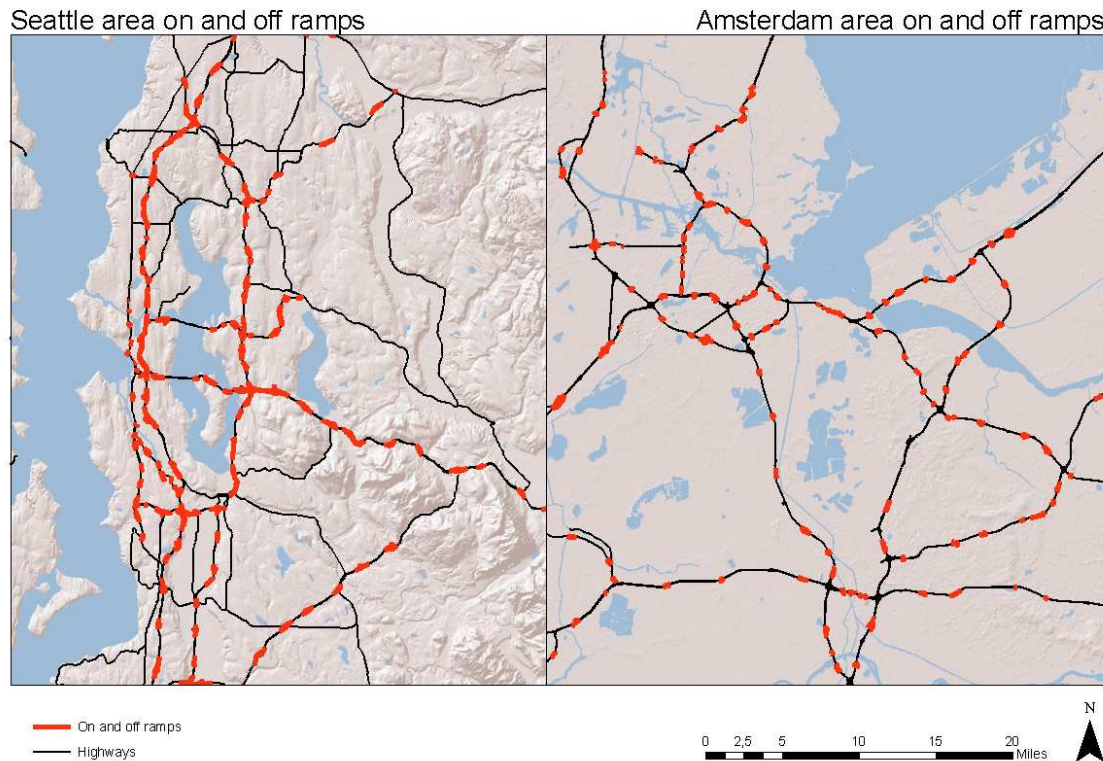
For a comparison between Dutch and Washington traffic, the Seattle-Tacoma conurbation is most comparable. This area is a vastly stretched metropolitan area that (according to the US census bureau, 2007) inhabits a population of about 3.2 million. As can be seen in Figure 1, the size and population spread of the Seattle-Tacoma metropolitan area are roughly comparable with the northern part of the Dutch main urban area (“Randstad”).



**Figure 1. Population densities in Seattle metropolitan area and the northern part of the Randstad (called “Amsterdam Metropolitan Area”) to increase recognition during the visit. Data: ESRI (2009), CBS (2009), WSDOT (2009), RWS (2006).**



The highway system in the Seattle area seems to be comparable as well (see Figure 2). The area has a network that appears to be slightly denser than the Amsterdam area network, with a ramp density that appears even denser than with Dutch highways. However, most of the Washington network is not equipped with dynamic information systems (lane closure systems, speed advisory systems, congestion warning systems, etc.). Currently a nine mile stretch of highway in the Seattle area is being equipped with an “active traffic management” system.



**Figure 2. On and off ramps on highway systems in the Seattle and Amsterdam areas. Data: ESRI (2009), WSDOT (2009), RWS (2006)**

Although usage of train, bicycle and public transport seems to increase, car and trucks are by far the most used transport modes in Washington. This leads to large congestion problems in the urban areas. This congestion leads to travel times in the Seattle area that are, on many stretches of highway, twice as long as travel times in non-congested situations (Washington State Department of Transportation abbrev. WSDOT, 2008; p. 21). A similar situation is apparent in the Netherlands, where reports of traffic jams are part of daily life. A report on travelling times on 5 highway routes in the Netherlands showed that on average, travel times are 25% longer in during peak hours (Hilbers et al, 2004).

Conclusively, the infrastructure and congestion problems of the Washington urban areas seem comparable with the Dutch situation. However, we have noted some striking differences between daily traffic in Washington and the Netherlands:

- From our impression, Washington drivers seem to be more disciplined. We have observed that drivers that are not permitted to use High Occupancy Vehicle lanes only marked by diamonds on the road, will not use them (even when no traffic regulator is in sight).
- The keep-your-lane principle on US highways (where cars can take over cars on the right side) makes for a more relaxing experience of highway travelling.
- A large portion of the highways in Washington does not have guardrails to prevent cars from getting on the wrong side of motorways. WSDOT notes that this is identified as a very important issue and work is underway to install cable barriers on stretches of highway.
- According to incident responders, road users in Washington frequently call Traffic Management Centers to signal stalled cars on the road or shoulder.
- Traffic law violators are only ticketed by police officers in Washington, while many traffic violations are detected and ticketed automatically in the Netherlands.
- Stopping on highways, or on the shoulders of highways, seems to be more common for Washington drivers than for Dutch drivers. Drivers will stop on the shoulder of motorways to make a phone call. Cars frequently run out of gas and cause traffic jams. According to incident managers in Washington and Oregon, it is not even uncommon that cars that run out of gas will end up on a traffic lane on a bridge.

### Organizations involved in incident management

A score of parties is involved in Traffic Incident Management on the highways and freeways in the state of Washington. As can be seen in the following list of parties involved in incident clearance, their status and the scale of operation of these parties vary greatly.

- WSDOT - Washington State Department of Transport (state)
- WSP – Washington State Patrol (state)
- Local fire departments, police, and emergency medical service providers (local)
- Privately sponsored motorist assistance vans (private)
- Towing – Private tow truck companies (private)
- Department of Ecology - when spill clean-up is necessary (state)
- US Coast Guard - when spill clean-up is necessary (national)

This study focuses on the first two parties, namely the WSDOT and the WSP. These parties are very frequently involved in incident clearance. These parties operate on state level, on the state managed part of the highway network.

### WSDOT – Washington State Department of Transportation

WSDOT is a state organization that is responsible for Washington state transportation infrastructure, comparable with Rijkswaterstaat in the Netherlands. According to the WSDOT website, their policy priorities are: *“reducing traffic congestion, preserving transportation infrastructure and making safer roadways”* (WSDOT, 2009b).

WSDOT has set a number of goals for their policy. Their main goals for the next 10 years are to improve travel times by 10 percent, reduce collisions by 25 percent and improve trip reliability by 10 percent. In order to achieve these goals the following categories of measures are being taken:

- “Strategic” increases of network capacity
- Increasing the efficiency of road capacity usage



- Managing of traffic demand

WSDOT talks of “strategic” increases of network capacity. This means that, just like on the Dutch highway system until recent, state Washington is not planning to increase the state network capacity through large scale physical upgrades. In order to increase safer and more efficient use of network capacity, the WSDOT has started an incident response program and operates traffic management centers (TMCs). The incident response program and the TMCs will be elaborated upon in the next sections.

### Incident Response Program

As stated before, highways in Washington are used at or above network capacity. This results in dire consequences of road blockages. A blocked highway lane can result in miles of backups and long delays. According to WSDOT, *“a large portion of all congestion on urban freeways is caused by collisions, disabled vehicles, spills, and other events that impede the normal flow of traffic. As a result, four to ten minutes of traffic congestion (depending on the volume of traffic on the road) can result from every minute a lane remains blocked.”* (WSDOT, 2009a)

To “keep Washington on the move”, the Incident Response (IR) program has been initiated. This program deploys so-called Incident Response Teams (IRT). The IRT staffs are a group of WSDOT maintenance employees who respond to blocking incidents on Washington state freeways and highways. According to WSDOT, *“their main function is to clear roads, help drivers and restore the normal flow of traffic as safely and quickly as possible”*. (WSDOT, 2009a)

WSDOT has deployed tow and push trucks since the 1960s. The IRT program started as a pilot program in 1990. Currently, WSDOT has a fleet of 58 IRT vehicles. 38 of the IRT vehicles are based in the Seattle area. According to WSDOT, IRT personnel *“are available for call-out to respond to major incidents 24-hours a day, seven days a week to provide traffic control, traffic rerouting, mobile communications, and assistance in incident clearance and clean up”*. (WSDOT, 2009a)

Most IRT operate in a “roving” mode, during peak traffic periods. Roving IR units do not only re-locate blocking vehicles, but also help motorists with a flat tire, jump starts, a gallon of gas, and assist with incidents in many other ways. According to WSDOT, this roving mode *“has resulted in IR program units clearing roads and helping drivers, by simply driving upon an incident the majority of times, reducing incident clearance times”*. (WSDOT, 2009a)

According to WSDOT, the most important reason for deployment of the IR program is motorist and incident scene safety. Their argument is that *“any incident has the potential for creating secondary incidents such as vehicles running out of fuel or overheating, or collisions that occur in the backup as a result of lane changing and rapid braking”*. WSDOT concludes that *“the quicker the original incident is cleared, the less time motorists and response personnel are exposed to traffic hazards and the possibility of secondary collision”*. (WSDOT, 2009a)

### Traffic Management Centers

The Washington State Department of Transportation crews keep their eyes on traffic and highways via seven Traffic Management Centers (TMCs) located around the state. Traffic Management Centers are the nerve center of highway monitoring and operations. According to WSDOT, the staff employed at the Washington Traffic Management Centers has these functions: (WSDOT, 2009c)

- *“Monitor traffic and identify problems using hundreds of cameras located throughout the state on the highway system.*
- *Use data from traffic detectors on the highways to get a real-time picture of traffic conditions.*
- *Coordinate response with the Washington State Patrol and other law enforcement and emergency response crews when responding to incidents on the highway.*
- *Coordinate activities of our WSDOT incident response teams who help stranded drivers, move disabled vehicles, and also help keep traffic moving safely while emergency responders help people involved in accidents.*
- *Operate reversible lane control systems and ramp meters to help manage traffic flow and reduce congestion.*
- *Provide up-to-the-minute information about what is happening on the roadway, including accidents, construction, and some travel times, to drivers through our highway advisory radios, electronic signs, the web, and the 511 traveler information phone system.*
- *Provide up-to-the-minute information to news reporters, particularly radio and television reporters.*
- *TMCs are a critical component of our coordinated response to emergencies and disasters anywhere in the state.”*

The TMCs visited in the study trip mainly used cameras and maps showing concurrent travel speeds to monitor the highway systems. Currently, TMCs are testing license plate recognition systems to derive more accurate travel times. The TMCs coordinate WSDOT resources such as sand trucks and plows, and next to these the resources for extra traffic control measures.

As far as the study trip has shown, the TMCs main instrument of influence on traffic flows is through the coordination of WSDOT staff for incident response. Next to that, the Seattle Metropolitan area TMC can handle the amount of flow that enters the network through traffic lights at a score of onramps of the highway system. The TMCs cannot open lanes or manage traffic speeds over distance, like Rijkswaterstaat can do through dynamic road information systems.

### **WSP – Washington State Patrol**

The Washington state patrol is the main highway authority in the state of Washington and is therefore responsible for keeping the roads open and in case of a blocking situation getting the roads open as soon as possible. Furthermore, WSP is responsible for crime scene investigation in case of a collision. The “keeping roads open” goal is emphasized in the 1<sup>st</sup> of the 5 goals listed on the WSP website: *“Make Washington roadways and ferries safe for the efficient transit of people and goods”*. (Washington State Patrol abbrev. WSP, 2009)

The WSP is responsible for dispatching responders in case of incidents. The WSP can dispatch both WSP officers and WSDOT IR teams alike. Like the WSDOT IR teams, most WSP officers have a defined stretch of highway that they continuously patrol during their shift. WSP officers focus on safety and law enforcement. When not handling traffic incidents or collisions, the primary mission of the WSP is traffic law enforcement. At a collision scene, WSP officers are typically involved with the safety of the scene, and crime scene investigation.

WSP is responsible for contracting and dispatching tow companies. Only contracted towing companies are asked to clear lanes. A number of towing companies is contracted to tow for WSP. For fair assigning of towing jobs to towing companies, WSP uses a rotational list. To be able to participate in the WSP towing operations, towing companies must meet requirements set by the WSP.

The WSP has a strong collaboration with WSDOT. One testimony of this collaboration is that WSDOT seems to have some influence on WSP enforcement priorities. According to WSDOT staff member Rick Philips, WSDOT has contracted WSP several times to ensure enforcement of proper High Occupancy Vehicle lane (in Dutch known as “carpoolstrook”) usage when new HOV lanes were opened. An Incident Response specific agreement is the JOPS agreement, which will be elaborated upon in the next section.

## WSDOT and WSP collaboration

WSDOT and WSP have acknowledged that they share goals. Their collaboration has been formalized in the JOPS agreement, which states that *“the WSDOT and the WSP have long recognized their joint responsibilities for enhancing the safety and security of the Washington State transportation systems”* (WSP and WSDOT, 2008).

The WSP field operations division is responsible for traffic law enforcement, collision investigation, commercial vehicle regulations and motorist assistance on Washington State’s highways. WSDOT supports WSP with these operations through a wide range of activities and facilities varying from traffic incident management to disaster response, winter operations and transportation security, amongst others.

In 2002, management in both agencies developed the JOPS (Joint Operations Policy Statement) policy agreement to delineate responsibilities and state policy as guidance for future collaboration. The agencies have used this agreement to enhance their collaborative relationship. In 2006 the governor’s office requested that both agencies would start collaborating on performance monitoring and accountability goals related to incident response and traffic incident clearance times. This led to an update of the JOPS statement, in which agreements on performance measures were elaborated.

The JOPS agreement defines the roles and responsibilities for both agencies for different areas of the transportation system. For our research objectives the following parts are of importance:

- Data sharing
- Traffic incident management
  - Safe, quick-clearance
  - Incident response team (IRT) program
  - Instant tow dispatch
- Facilities
  - Shared facilities

In the next sections, these parts will be elaborated upon.

## Data sharing

The objective for data sharing is to create standards for data sharing, such as:

- Data content and formatting
- Common terms and definitions
- Data documentation and meta-data
- Data collection and update methods and procedures
- Data accuracy

- Data update cycles
- Third party data

WSP and WSDOT incident reports are stored in (respectively) the Computer Aided Dispatch (CAD) and Washington Incident Tracking System (WITS). The main result from this collaboration is linking the WITS and the CAD systems and therefore the possibility to provide the data needed for the GMAP documents.

The JOPS agreement states that formal protocols will be developed for sharing real-time operations data, such as CAD, video traffic camera monitoring and crash and traveler information. This will create the possibility to establish a real common operational picture.

### **Traffic incident management**

In the JOPS agreement Traffic Incident Management is defined as the marshalling of emergency response agencies and resources including towing, cleanup contractors and others that respond to, investigate, and clean-up traffic incidents. Work is performed safely and as quickly as possible to reduce congestion and improve responder and motorist safety. Efficient Traffic Incident Management requires developing and maintaining effective partnerships with a variety of responding agencies, organizations, and vendors.

The WSP communication center dispatches and coordinates the WSP troopers and the WSDOT incident response teams. Furthermore, the role of WSDOT in major incidents has been defined in the JOPS agreement: *“During major incidents, WSDOT’s primary Incident Response role is to coordinate with and support WSP and other emergency responders as needed, by providing traffic control to improve safety of on-scene responders and motorists approaching the incident, and periodic incident and traffic updates to the appropriate TMC for dissemination through established traveler information systems”* (WSP and WSDOT, 2008; p. 11)

### **Shared facilities**

Currently the situation as can be seen in King County, a WSDOT TMC and a WSP dispatch centre, is common throughout Washington. During our visit to the Vancouver area TMC the benefits of a shared facility became clear. Instead of using the phone to communicate with each other staff can just walk to their counterpart of the other agency and ask for specific information or a specific camera view of the area. Staffs from both agencies say they are satisfied with this situation. In JOPS both agencies agreed to develop a 10 year shared facilities actions plan to share more facilities.

### **Context of Washington traffic incident management**

Conclusively, the Washington transport system challenges are similar to the challenges that Rijkswaterstaat faces in the Netherlands. In the metropolitan areas, the demand for transportation is equal or higher than the transportation networks can facilitate. In both the Netherlands and Washington, incidents that cause lane blocks have dire consequences for traffic flows. Especially during peak traffic periods, lane blocks cause large traffic jams.

Washington state does not plan large scale structural, physical increases of network capacity. Both WSDOT and Rijkswaterstaat try to increase network capacity (and road safety) through increasing the effectiveness of the current transportation networks. In Washington and the Netherlands, this has led to the development and improvement of traffic and incident management policies.

WSDOT has been successful in collaborating with WSP. Mutual goals have been identified and turned into shared responsibilities in the JOPS agreement. In the next chapter of this report, the practical collaboration of WSDOT and WSP in incident management and performance measurement is shown.



## Work processes: how are WSP/WSDOT involved in an incident?

To understand the process of incident management between WSP and WSDOT, this chapter will go through the steps involved in the clearance of an incident. This chapter will step through a lane blocking incident in King County (covering most of the Seattle metropolitan area). The incident management process is depicted Figure 3 and Figure 4.

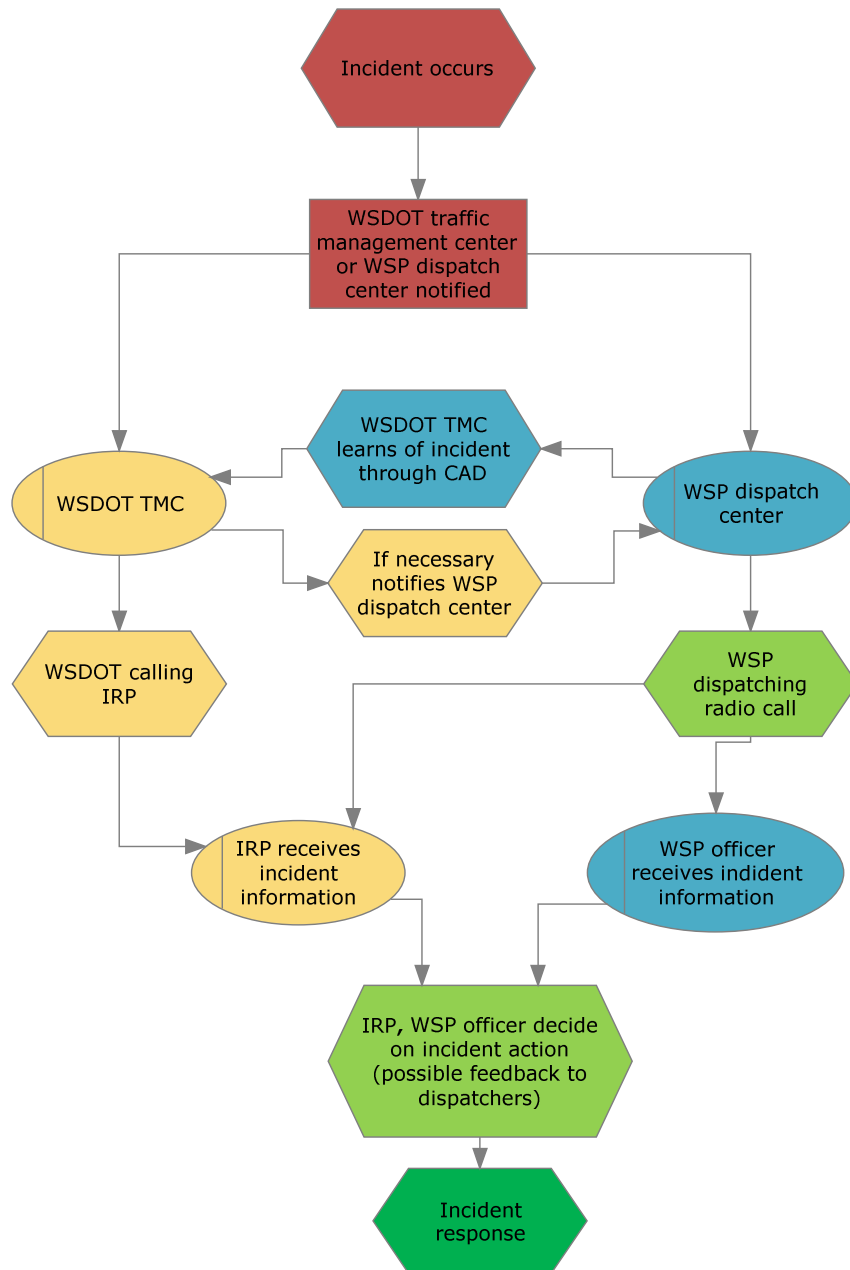


Figure 3. Diagram of WSDOT (yellow), WSP (blue) and shared (green) communications for the clearance of a lane blocking incident in King County, WA.

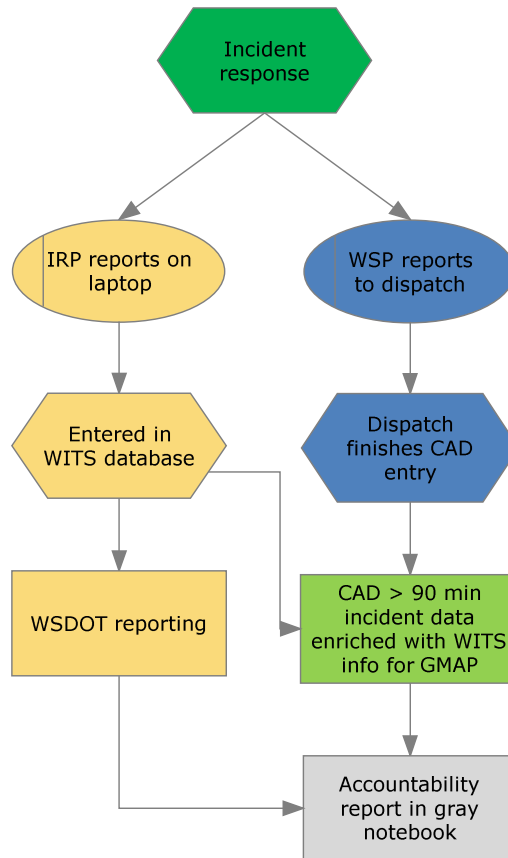


Figure 4. Diagram of reporting by WSDOT (yellow), WSP (blue) and shared (green) for a typical lane blocking incident in King County, WA.

## Step 1 Detection

The WSP and WSDOT have a number of ways to detect an incident. Incidents are detected by:

- A call from the public to either the WSP dispatch center, a WSDOT traffic management center, the general emergency number or other public safety organizations.
- Roving IRT and WSP teams. IR teams and WSP officers roam parts of the highway system, and frequently detect incidents along the highway. (According to the WITS reporting team, about 60% of the WSDOT-recorded incidents are detected by responders, rather than responders being notified by the dispatch center.)
- The WSP airplane circling and observing King County traffic during rush hours
- TMC workers seeing unusual situations through one of over 400 cameras that display the current highway situation
- TMC workers attracted by unexpected traffic situations

Callers reporting malfunctions and abandoned vehicles (usually cars stopped on the highway shoulder) usually report to the WSDOT Traffic Management Center. Emergency situations are usually reported at the WSP dispatch center.

## Step 2 Identifying and locating

If an incident is reported through a call from the public, identification and location of the incident is ideally done before WSP officers or IR teams are dispatched. If an incident is verified by multiple callers or a call from somebody directly involved in the incident, responders are dispatched nonetheless.

Highway incidents are i.e. located as incidents on a given stretch of road near or between given landmarks or within interchanges. The WSDOT TMC can pan cameras to look for a given incident location. Both WSP and WSDOT have a mapping system that allows them to search for landmarks near highways. The WSP will make an entry in their CAD system, and start and follow a dispatch based on that CAD entry.

## Step 3 Dispatching

If the incident is detected by WSP, the incident will be shown in the CAD system visible to WSP officers and the WSDOT TMC. Furthermore, WSP officers in the area will be given information on the incident through WSP radio. WSDOT's IR teams are equipped with WSP radios, and will receive the same information.

The WSDOT TMC can only send information on the incident on a radio channel that is designated for IR teams. If necessary, the TMC will contact the WSP communications centre to exchange information on the incident. If an incident is relayed through WSP radio, IR and WSP officers will communicate directly on who will respond, and what actions might be necessary.

## Step 4 Incident resolve

Incident resolve might lead to new communication necessities. These are done directly by IR teams or WSP officers, or if necessary handled by either WSDOT or WSP communication centers. IR teams and WSP officers will often negotiate incident resolve measures over the WSP radio channel. Other possible forms of communication in the incident resolve process:

- In the instant tow dispatch program, tow trucks are asked for immediately by the WSP dispatch center (instead of waiting for a responder to arrive to the scene).
- Dispatch centers frequently call in to their teams to check on them.
- WSP aircraft might check on a known incident and change status or report an incident already solved.
- The TMC is sometimes asked to use their cameras to show a WSP officer working (to ensure WSP officer safety).

## Step 5 Reporting

WSP and WSDOT differ in onsite reporting methods. WSP officers report through the CAD (Computer Aided Dispatch) system kept by dispatchers. WSDOT responders create their own logs in the WITS (Washington Incident Tracking System) system.

### CAD

Both WSDOT IR teams and WSP officers communication is reported in the CAD tool. The CAD is a log system in which dispatchers enter all incident related information, organized by an automatically generated incident number. WSP officers can add information to this incident. Weather and road condition are usually noted by WSP officers (for criminal investigation). There is near-constant

contact between both IR teams and WSP officers on the one hand and the WSP dispatch centers on the other hand. Information is continually and immediately updated by WSP dispatchers in the CAD system. Therefore, logged times in the CAD system are very reliable, but the information level on (especially common) incidents in the system is usually low. Furthermore, only incidents with WSP involvement are usually recorded in the CAD system.

## **WITS**

In addition to contact with the WSP dispatch centers, the IR teams report by using the WITS system. This is a database accessed through a non-synchronous data entry program. In this program, the incident responder can leave a number of details on the incident. The incident responder will usually make notes during an incident, and log incident information after. IR teams are asked to log the most relevant information as soon as possible and if necessary write down details on the incident later.

In WITS, the start time is defined as the time that the responder is notified of an incident, or the time that the roving responder finds the incident location. The end time is defined in two ways: the moment all lanes are open, and the moment that the last responder leaves the scene. Location is noted as highway number, milepost and direction in the system; nearby landmarks can be added as well. Because of the structured layout of the US highway system, direction can be adequately noted by Northbound, Eastbound, Southbound or Westbound.

Furthermore, the reason for response will be stored. Actions taken might be recorded, as well as what (and how many) lanes were closed during the incidents. The severity of incidents is classified as non-injury, injury or fatal incidents. Responders will usually add information on why an incident took long to clear, when incident clearance takes long. A number of conditions that complicate incident clearance are standardized.

A number of features in the program contain interesting takes on reporting:

- An option to place remarks of drivers (not responders) involved in the incident (so positive remarks can be shared within the organization)
- An option to add pictures to a record
- A spellchecker to make sure reporting is errorless

Logging when the incident is finished does make for less reliable recorded information than available in the CAD system. On the other hand, more detailed information on incidents can usually be found in the WITS database.

## **Step 6 Analysis and accountability**

WSDOT and WSP share a responsibility to report accident clearance times. According to WSDOT (2007), the WSDOT/WSP shared goal is to reduce average incident clearance times of incidents that last longer than 90 minutes. The WSDOT reporting is based on the WITS database. Statistics on clearance times, incident types, vehicles involved are calculated from this database. This reports all incidents with IRP involvement. In these statistics, clearance times as recorded by IRP are stored.

All incidents with an over 90 minutes clearance time are subject to further analysis. The CAD data is leading in the selection of over 90 minute incidents. For the GMAP (accountability) and Gray Notebook (WSDOT performance) reports, the CAD data on these incidents is joined with the WITS database. The choice process is shown in Figure 5.

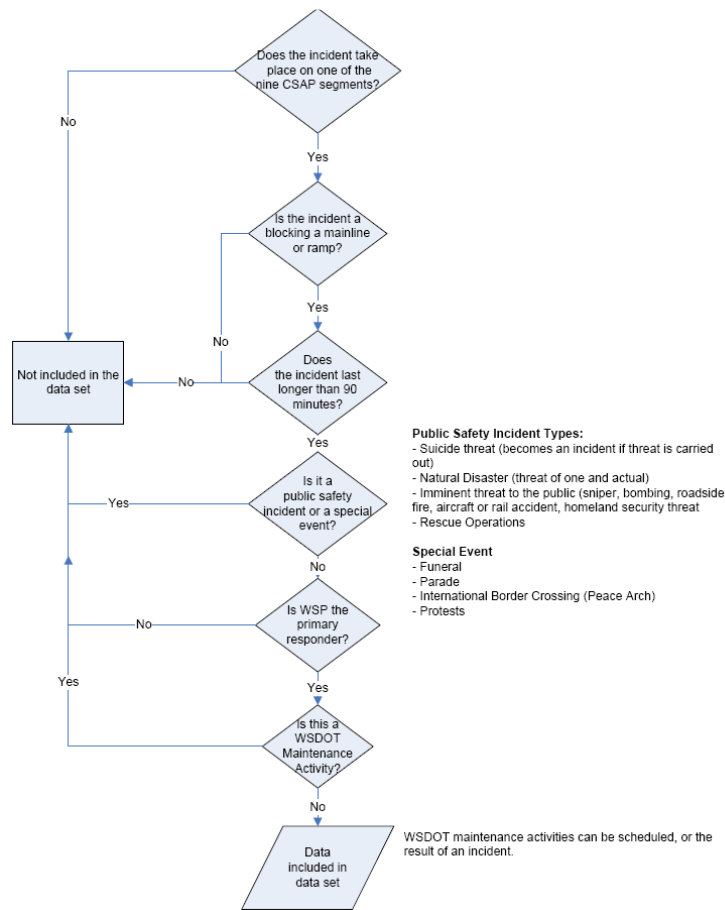


Figure 5. Choice process for joining WSP and WSDOT data

Not all recorded over 90 minute incidents are taken into account. Situations such as natural disasters and situations solved by local law enforcers are kept out of the data analysis. This selection is done because of the lack of control that the WSDOT and WSP have over the incident times in these types of incidents.

The join between WITS and CAD data is usually done manually. Often, the WITS team will try to proactively add a CAD file key to their WITS records. If they are not able to do so jointly stored information is used to match CAD and WITS records manually. Jointly stored information includes incident times, location or license plate numbers of vehicles involved.

WSP and WDOT are held accountable for incident clearance times. WSDOT report in “the Gray Notebook”, a periodically published report on the performance of state Washington government services. The reporting in this notebook focuses on how well the 90 minute clearance time goal is met. A portion of the over 90 minute incidents are detailed, to outline what types of incidents cause long clearance times.



## Lessons from the visit

The SPINLab visited WSDOT and WSP to learn from their practice for incident management and their own research of incident management evaluation. As outlined in the introduction, a number of questions were formulated before the visit. In this section, these questions will be answered.

### In how far is a Common Operational Picture achieved in state Washington?

The concepts of network enabled capabilities and the common operational picture are new to the WSDOT and WSP people interviewed. However, these organizations have tried to tackle communications issues.

Some understanding of 'Common Operational Pictures' is necessary to answer this question. According to Alberts et al (2000; p. 240), a Common Operational Picture (COP) *"does not imply that everyone in the battlespace sees exactly the same thing, in the same way, at the same time. Rather it means that at least a subset of the people have the same information available about key components of battlespace awareness in a timely manner. The effect is that they share a common perception of the situation. This common perception enables better communication and mutually supporting actions."*

In our interpretation of Network Enabled Capabilities for incident management, a COP will be established when responders and coordinating staffs have the same information on a given incident. Traffic managers and dispatchers would know which responders are on the scene; Responders would know which responders are likely to attend to a scene; Responders would know about other incidents in the area. All involved would be able to know what effect an incident has on congestion on the road, and all involved would be able to know all specifics of the incident. These conditions are partly met in Washington.

In King County, the WSP dispatch center and WSDOT TMC share information through CAD, and highway monitoring cameras. However, these centers only communicate when the severity of an incident demands more information or a larger coordination effort of sources than these centers can manage alone. The distance between these centers limits interaction to telephone and textual contact. In the Vancouver area (in the south of Washington), the TMC and dispatch center are collocated in the same room. This stimulates interaction between both coordination centers and leads to a better awareness of situation, responder location, and coordination of joint actions.

All responders in an area are notified of an incident over WSP radio if the incident is detected at the WSP dispatch center. WSDOT and WSP responders will communicate on who will respond over the WSP radio channel. At that moment, the dispatch center and all responders will have an accurate understanding of the incident location. The responders will know who will respond, and responders are able to communicate with responders and the dispatch center on further actions if necessary.

However, neither the responders nor the dispatch center are able to know where all responders are at the moment an incident is notified. Furthermore, communication channels are not shared with local fire departments and other possible responding organizations. Fire departments and others do not share the WSDOT and WSP prioritizing of accident clearance.

Conclusively, no complete Common Operation Picture is reached in incident management in Washington. The operational picture in (e.g.) King County is limited to:

- WSP and WSDOT responders and dispatch centers.
- An understanding of actors and actions after notification of the incident.
- Verbal and textual information through radio and the CAD system. Spatial information is not available to responders.

### **How can Washington incident clearance performance be compared with RWS performance?**

WSDOT keeps track of the clearance times of all incidents that were responded to. This includes (next to collisions and other big incidents) helping drivers when they run out of gas, experience mechanical failures or have a flat tire. Dutch incident management focuses on “big incidents”: collisions, etcetera. Thus, comparing average incident clearance times between Rijkswaterstaat and WSDOT would be useless.

However, WSDOT and WSP share a measure of incident clearance performance as well. This measure focuses on “big” incidents and seems to be a more fruitful measurement of incident measurement performance. WSP and WSDOT measure the time it takes to clear an incident, and focus on over 90 minute clearance times. This is implemented as the moment a responder enters the scene (start incident), until the moment that all lanes are opened (incident cleared). In reporting, the services then focus on all incidents that took longer than 90 minutes, from the moment the incident is found or notified, until the moment all lanes are open.

This is a clear, easy-to-measure implementation of performance measurement. Arbitrary as it might be, a marker like the 90 minute line makes it easy to select incidents that need more attention. However, there are a number of downsides to this implementation:

- Clearance delays because of late detection are not taken into account; although with current widespread cell phone use, this does not seem to be a problem.
- Clearance delays because of responders having problems arriving at the scene are not identified (if not detailed in the responders’ report). This might lead to inexplicably long recorded clearance times.
- Clearance delays because of problems with finding an incident are not identified (if not detailed in the responders’ report). This might lead to inexplicably long recorded clearance times.
- Traffic congestion because of incident clearance activities on the shoulder of the road are not taken into account.
- No measure of the actual traffic delay caused by the incident is taken into account

Conclusively, this is a simple and clear implementation of incident clearance performance measurement. Although these measurements should not provide a definite selection to analyze possible information deficits and other factors leading to long clearance times. However, we do feel that an additional measurement, in methodology comparable to WSDOT and WSP reporting might be a good base to compare Dutch incident clearance performance with Washington incident clearance performance.

## What are the success factors that contributed to current Washington state incident management policies?

All interviewed seemed convinced that WSDOT and WSP have been very successful in improving incident management coordination between these organizations. A number of factors have contributed to the development of current Washington incident management policies. Here, these factors are described, and an assumption of the applicability to the Dutch situation is given.

### Common organizations, common goals

WSP and WSDOT share responsibilities for an equal territory (statewide; highways). State politics have pressured the WSP and WSDOT organizations to share a goal of getting lanes on the road open as soon as possible (see chapter Context). This shared goal made it relatively easy to implement a shared statement. The stated collaboration has given WSDOT and WSP the possibility to share workloads between WSP officers and WSDOT IR teams, and thus (according to interviews with WSP and WSDOT representatives) safer and faster incident clearance.

The level of collaboration between WSP and WSDOT has led to a number of unique measures: WSP and WSDOT share radio channels and facilities. According to WSP and WSDOT staff, these arrangements have made an important contribution to the effectiveness of Washington incident response.

It has been much harder for the WSP and WSDOT to cooperate with (e.g.) fire departments: these departments have a different territory, and have a different understanding of goals considering highway incidents. They do not share the state priority of keeping traffic flowing. During talks about incident management with (e.g.) Fire Departments, WSP and WSDOT have tried to convince other incident responders of their priorities. Their key argument is that emergency services' responsibility for public safety does not end at the incident site: traffic blocks might end in a situation that could be more hazardous for public safety than the original incident. However, the larger gap between state agencies and local responders seems difficult to bridge.

### Measuring performance

WSP and WSDOT have been keen to measure their performance, and try to meet defined goals. Awareness of the effectiveness has made it easy for the WSP and WSDOT to convince others about the necessity of their policies. In this perspective, a comparison with the Oregon State Department of Transportation (ODOT) incident management policies in Portland might show the usefulness of performance measurement. In comparison with WSDOT, ODOT has done a lot less to measure their incident clearance performance.

As heard during a visit to the ODOT TMC in Portland, ODOT also have a troublesome collaboration with the local police authority in the Portland area. The Portland Police Bureau have a different comprehension of goals than the WSP, and there seems to be little political incentive to improve collaboration. Frankly, the local police authority regards the ODOT incident responders as the guys that clean up afterwards.

One of the reasons pointed out by ODOT staff, is that they have found it hard to find common ground with the local police authority. They see their lack of performance measures on incident clearance as one of the reasons for not being able to get this common ground. ODOT cannot show how much use they are to the local police authority; They are (e.g.) not able to show in which number of incidents,

and how much, ODOT incident responders could be able to assist in fully police-managed incidents. ODOT has identified the need for better incident clearance performance measurement, and is currently working to improve the quality of their operational reporting.

### **Social networks**

WSP and WSDOT are keen on effective collaboration between the different levels of their organizations. Some social factors seem to contribute to this collaboration. According to WSP chief John Batiste, WSP officers are encouraged by their staff to regularly have a coffee with their WSDOT counterparts. Better contacts between officers and IRT will improve collaboration.

Another means of improving collaboration has been achieved through enlisting former WSP officers in WSDOT service. Apparently, senior WSP officers retire relatively young. A portion of these officers start a career in WSDOT service, where they (e.g.) can upkeep and use their own WSP networks.

### **What WSDOT/WSP methods can contribute to fast clearance times in the Netherlands?**

Previously, a number of methods have been introduced in the Washington state incident management program to speed up incident clearance. This paragraph will show a number of Washington ideas that might accomplish faster clearance times in the Netherlands.

#### **Instant tow dispatch program**

On most highways, tow trucks are asked to move to the scene when a responder on the scene asks for one. This way, tow trucks will only be dispatched when the need of a tow truck is verified. However, this makes for clearance times that are longer than necessary. If tow trucks are only demanded by responders on the scene, the incident clearance has to wait until a responder arrives at the scene, and then again until the tow truck arrives. It is likely that the collision causes a traffic jam. This traffic jam will grow, leading to a situation where every delay in the dispatch of a tow truck leads to a longer time for the responding tow truck to overcome the traffic jam and reach the collision scene.

In congested areas, when a lane blocking disabled vehicle is reported at WSP or WSDOT, a tow company is immediately asked to go to the crash site. Contracted towing companies have accepted an obligation to respond to an incident whenever they are demanded to do so. If tow trucks respond but return without having had to tow a vehicle (a so called 'dry run'), their expenses are (partially) covered with a small fee. This approach has led to a small number of fees being paid by WSDOT, and a big improvement in incident clearance times.

#### **IR teams help stranded drivers**

In Washington, WSDOT IR teams help drivers when with a simple mechanical failure, a flat tire or with a gallon of fuel when they run out of gas. Commercial services in the state (comparable with the Dutch 'Wegenwacht' offer comparable help. IR teams help drivers as long as such a commercial service is not at the scene.

At first, helping stranded drivers seems to be a Samaritan sort of charity, and might be considered as something that should not be a burden on society. The WSDOT take on this is that leaving a stranded vehicle on the shoulder of a road is a burden on society as well. Cars halted on the shoulder distract drivers on the highway, and cause a safety hazard for vehicles that accidentally hit the shoulder of

the road. Getting drivers to move (be it on the highway, or off the highway) reduces safety hazards and prevents slowing traffic due to 'rubbernecking' (a situation where traffic jams happen because drivers are slowing speed while looking at something on the side of the road). In this perspective, helping stranded drivers by public services might not be a bad idea.

### **Pushing cars off road**

Both IRT and WSP vehicles are equipped with a bumper for pushing cars off the road. The IRP vehicles even have bumpers that minimize damage done to the vehicles while being pushed. Cars are being pushed off the road after collisions when vehicles are not mobile anymore.

Just like in the Netherlands, drivers in Washington are obliged by law to drive their cars off the highway after a collision, when their cars can still be driven. Just like in the Netherlands, WSP and WSDOT have had trouble to enforce this law. Incident responders can use their bumper to push stranded vehicles off the road after such a collision. The foresight of seeing their cars being pushed off the road might entice drivers to get their cars off the road by themselves.

### **Conclusions**

Conclusively, WSDOT and WSP have been improving their incident management program mostly through more efficient use of existing resources. The most important improvement on Washington incident management is the formalization of collaboration between WSDOT and WSP. Both parties accept these responsibilities, and both parties are held accountable for incident clearance goals. This collaboration has enabled a broader operational picture for the WSDOT and WSP participants and allows for better use of (human) resources in incident clearance.

It is important to find common ground when formalizing such collaboration. The common ground between WSDOT and WSP has been safety: so instead of focusing on travel time reduction, WSDOT's main argument for collaborating with them has been that longer traffic jams will increase the chances of additional collisions. And as the JOPS agreement can tell, this argument has been quite successful.



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## Appendix I: Program

A number of interviews, ride alongs and interactive sessions were performed to answer SPINlab questions. The following content was covered:

### Day one

Day one consisted of interactive sessions/interviews with policymakers and statistical and GIS experts.

**Welcome.** Welcome from the managing people of WSDOT. Overview of WSDOT work.  
(Lenzi/Trepanier/Legg)

**Incident response overview & WITS database.** *“Early detection and quick-clearance of traffic incidents helps reduce congestion and prevent secondary collisions. The Washington Incident Tracking System (WITS) was developed as a tool to capture response times, clearance times and other work performed by the Incident Response Program. The WITS database was upgraded in 2008 to improve data quality and analysis capabilities through automatic entry and improved error detection.”* (from: WSDOT (2008) Strategic plan for traffic incident management, 2008, p. 26)  
(Connelly/Boyd/McGuerty/Phillips)

**The Gray Notebook.** *“Agency wide performance reporting is a high priority at WSDOT and The Gray Notebook (GNB) is the agency's main performance assessment, reporting, and communication tool. Performance data for the Incident Response Program is published quarterly in The Gray Notebook.”* (from: WSDOT (2008) Strategic plan for traffic incident management, 2008, p. 26)  
(Connelly/Boyd/McGuerty)

**GMAP Data Partnership.** *“Prior to the establishment of the data partnership, WSDOT was using WITS data and using “Last Responder Leaves the Scene” as its measure of success while the patrol was using CAD data for their “All Lanes Open” measure. Since WSP’s CAD system is the only source of statewide data for all traffic incidents, this data sharing and analysis partnership has improved the accuracy of performance measurement reporting in both agencies.*

*By agreeing to use “All Lanes Open” for GMAP reporting, incident responders in both agencies now share a common performance measure in addition to agency specific measures. The use of “All Lanes Open” and “Last Responder Leaves the Scene” as performance measures is consistent with the Federal Highway Administration’s Focus States Initiative to develop national quick-clearance performance measures.”* (from: WSDOT (2008) Strategic plan for traffic incident management, 2008, p. 22) (Hilton/Kirkeby/Marsh/Connelly/Boyd/McGuerty)

**WSP Welcome.** A welcome to WSP working methods, and some insight into how WSP/WSDOT work is shared. (Batiste/Knorr/Hilton)

**Winter operations.** *“This is an ArcGIS Server application that displays a map of the current truck location and activity (speed, heading, chemical distribution, road temperature, air temperature). It also displays the know road conditions and treatment on state route line segments. We are tracking about 80 trucks now and continue to add more. Eventually hope to include pesticide sprayers and emergency response vehicles.”* (Quote email Alan Smith 21-1-09) (Alan Smith)

**Map service resource center.** “Map Service Resource Center (Homogeneous building and sharing of spatial data) – So far the resource center only serves out data and “tasks” for ArcGIS Explorer. In the near future we expect to deliver map services and spatial services that can be consumed by a variety of clients. The idea is to create one set of cartography/tools that can be used in many ways. ”

(Quote email Alan Smith 21-1-09) (*Alan Smith*)

**Safety Analysis – Determining areas of high collisions (CACs & CALs).** “DOT's new way to determine areas with high collisions” ” (Rick Philips (1-1-09) email) (*Faris Al-Memar*)

## Day two

Day two consisted of field experiences and insight into WSDOT/WSP operations in “King County, the metropolitan area that makes up Seattle, Tacoma and suburbs.

**Ride-alongs with an Incident Response Team and a WSP officer.** To get a feel of how communications and collaboration happens between WSDOT/WSP personnel on the street.

**Visit of Seattle Traffic Management Centre.** The Seattle area TMC is a fully equipped centre with the responsibility to keep congestion to a minimum. A visit of the TMC was done to see how incidents were managed and how communications were used (especially with the WSP).

**Visit to the King County WSP dispatch centre.** To see how communications are handled between emergency calls and WSP officers and WSDOT incident response teams.

**Fly-along with a WSP traffic managing airplane.** To see how airplanes are used in communications and traffic control in the Seattle metropolitan area.

## Day three

Day three consisted of visits to traffic management centres in Vancouver and Portland (Oregon) areas.

**Visit to Portland traffic management centre.** The Oregon DOT has slightly different responsibilities compared to the WSDOT. Furthermore they have a different relationship with law enforcers than their state Washington counterparts, and have a very different approach to measuring the effectiveness of their policies. Next to that, the Portland TMC has an interesting collaboration with the TMC in the Vancouver area (in Washington state)

**Visit to Vancouver area traffic management centre.** The Vancouver area traffic management centre is a WSDOT TMC collocated with a WSP dispatch centre, that serves the southwestern portion of state Washington.